A Re-Evaluation of the Northwestern Range of the *Melongena corona* Complex

BY

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(3 Text figures)

INTRODUCTION

Melongena corona Gmelin, 1791 is a common species along the coasts of Florida and eastern Alabama (CLENCH & TURNER, 1956: 171-172; plts. 100-105). This mollusk inhabits oyster bars and low energy intertidal zones. HATHAWAY (1957) completed the most thorough biological study of *M. corona*. A systematic review of the Melongenidae of the Western Atlantic was published by CLENCH & TURNER (*op. cit.*), who described the *M. corona* complex.

The *Melongena corona* complex consists of 3 morphologically different and geographically isolated subspecies: *M. c. altispira, M. c. corona,* and *M. c. johnstonei.* The genus as a whole is a highly variable group especially in terms of shell coloration and spination (CLENCH & TURNER, 1956: 171-172) (Figure 1).

Melongena corona altispira is distributed along the east coast of Florida, from St. Augustine to Miami. This subspecies is characterized by a high ratio of shell length to shell width (CLENCH & TURNER, 1956: 176-178; plt. 104).

The range of *Melongena corona corona* extends from Cape Sable, Monroe County, to Keatons Beach, Taylor County, Florida; *M. c. johnstonei* is distributed from Panacea, Wakulla County, Florida to Gulf Shores, Baldwin County, Alabama. Apalachee Bay was described as an area of overlap where a clinal relationship between the 2 subspecies occurs (CLENCH & TURNER, 1956: 172). (Figure 1)

Spination is the primary morphological character used to differentiate between *Melongena corona corona* and *M. c. johnstonei* (Figure 2). The former subspecies has 2 rows of spines on the shell, a shoulder row and a basal row. The latter has only a shoulder row of spines. Coloration was used as a secondary character for subspeci-

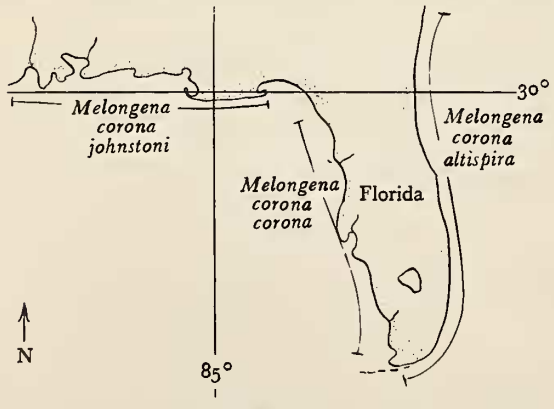

Figure 1

Map of occurrence of subspecies of the *Melongena corona* complex, according to CLENCH & TURNER, 1956

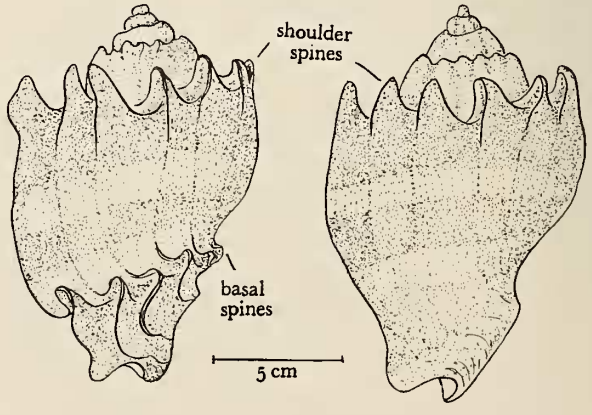

Figure 2

Subspecies of *Melongena corona* of the Gulf of Mexico
a – *Melongena corona corona* b – *Melongena corona johnstonei*

fic classification (Clench & Turner, 1956: 173-174, 178; plts. 94-97, 100-103, 105).

In my preliminary studies shell spination and coloration were shown to be variable characters throughout the range of the 2 subspecies. The objective of this study was to determine the actual value of spination and coloration as taxonomic characters for the 2 subspecies: *Melongena corona corona* and *M. c. johnstonei.*

METHODS

Melongena corona were collected at 5 stations along the west coast of Florida: Pensacola (Escambia County), Port St. Joe (Gulf County), Shell Point (Wakulla County), and Seahorse Key (Levy County) (Figure 3). Samples from Pensacola and Wakulla Beach were from *Thalassia* and *Spartina* habitats, respectively. Sandflats were sampled at Port St. Joe and Shell Point; at Seahorse Key collections were made on oyster bars.

Sampling was done by collecting all *Melongena corona* found in randomly selected areas at each station. All collections were done during low tide when the majority of snails were active (not buried in the sand). Sex, shell length, shell width, shoulder width, shell color, spire length, and spination were recorded for each snail.

Spination data consisted of the presence or absence of the basal row of spines and number and size of spines. Table 1 shows the location of the stations sampled, sample size, as well as the percentage at each station of individuals with basal spines.

Sex of the snail was determined by secondary sexual characters. A prominent yellow area around the entrance to the pedal gland distinguishes mature females. The penis of males is located on the right side of the head. Immature females lack both characters mentioned.

Non-parametric tests for equality of proportions were carried out on the binomial data obtained. Relationships between the treatments (geographical location, snail size) and the effect (spination) were thus investigated. Coloration could not be quantified due to the extreme variability.

Post-hoc tests were completed on all significant chi-square values. This type of test involved pairwise comparisons between all treatment levels. In this manner the levels that caused significant frequency differences were identified.

RESULTS and DISCUSSION

Table 2 summarizes the criteria used by Clench & Turner (1956) for the subspecific classification of *Melongena corona corona* and *M. c. johnstonei.* The stations sampled in this study included the range of both subspecies and the cline between them. The cline theory by Clench & Turner (*op. cit.*) was not supported by my data.

Shell color (banding) was found to be extremely variable at all locations sampled. The variability found among populations was similar to the variability represented

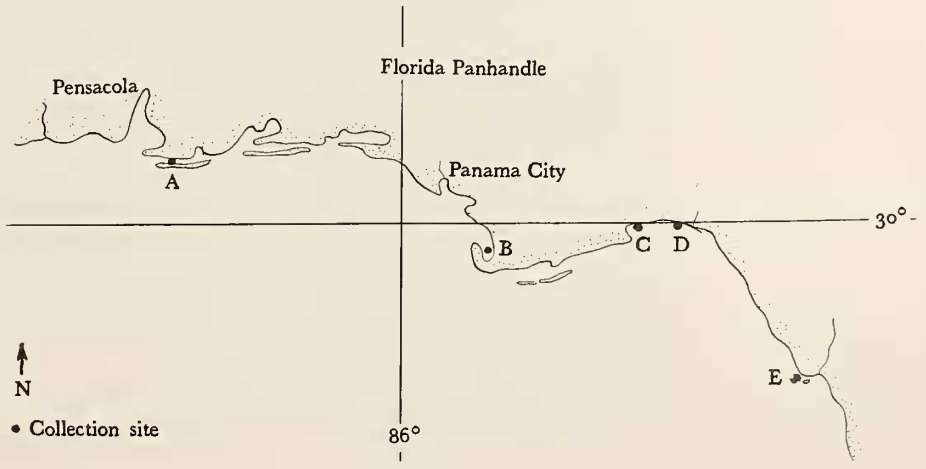

Figure 3

Florida Panhandle. Collection sites of this study

within each station. Consequently, coloration was considered an unreliable character for this species.

No difference was found in the proportion of shell shoulder width to spire length among stations sampled. Shell spination, although variable, was quantified at all locations studied. The basal row of spines (characteristic of *Melongena corona corona*) was found throughout the ranges of both subspecies and their cline (Table 1).

Table 1

Station	Location	Sample size	% with basal spines
A	Pensacola Escambia County	53	26%
B	Port St. Joe Gulf County	74	10%
C	Shell Point Wakulla County	52	79%
D	Wakulla Beach Wakulla County	61	40%
E	Seahorse Key Levy County	51	55%

The chi-square values of non-parametric tests for equality of proportions for spination as related to snail size were significant (0.01 level). In other words, the percentage of snails with basal spines is different according to size. Post-hoc tests of these data demonstrated that snails longer than 6.1 cm exhibit higher frequencies of basal spination than snails below 6.0 cm.

Similar tests were run on shell spination with respect to geographic location. The analysis of these data showed that basal spine frequencies are different due to geographic location, the chi-square value was significant to the 0.01 level (Table 2). No trends were apparent.

The sample from Pensacola, Florida, was analyzed for sex-linked spined morphology. No statistically significant differences were found between the sexes (26.9% of males and 23.8% of females had basal spines).

The results draw attention to the fact that individuals with basal spines are not confined to the range of *Melongena corona corona,* as defined by Clench & Turner (1956), but are also found throughout the range of *M. c. johnstonei.* Spination is not sex-linked, but is related to snail size and geographic location. Field data obtained on mating pairs included all possible combinations between spined and non-spined individuals.

Characters previously used for subspecific classification, other than spination, display high degrees of intrasubspecific variability and lack of intersubspecific character exclusion. Therefore, they can not be used to define the subspecies.

CONCLUSIONS

Because of their sedentary habit, encapsulated development, and absence of planktotrophic larvae, *Melongena*

Table 2

Melongena corona corona	*Melongena corona johnstonei*	Stations A-E
1. Shoulder is usually horizontal and narrow	1. Whorls shouldered	1. Within a given population both types were found
2. Shell reaching 205 mm	2. Shell reaching 171 mm	2. Continually growing species
3. Color. Ivory with spiral orange-brown bands, very variable	3. Color. Ivory with two or three bands of dark brown	3. Within a given population all color morphs for both subspecies were found
4. Spire subdepressed to extended	4. Spire extended	4. The spire was subdepressed to extended
5. Usually there is a single row of rather large spines at the base of the whorl. In other colonies the spines may be reduced to a single row at the shoulder whorl, the basal row being absent	5. Sculpture consisting usually of a single row of strong, erect or recurved spines on the margin of the shoulder whorl. Rarely there exists a rather weak series of spines near the base of the shell	5. All areas studied showed significant percentages of individuals with basal spines
6. May have two smaller rows of spines between the ones mentioned above	6. Not mentioned	6. Not found in areas studied

corona populations have a tendency to remain within the same area. Egg capsules that can be moved by mechanical means or tides are the most probable mechanisms of dispersal. Prior to construction of the intercoastal waterway, the only potential barrier to tidal dispersal in northwest Florida was the area between West Bay and Destin, where for approximately 80 km there are high energy beaches and no interconnecting marshes. Low energy beaches are encountered again in the Destin area, Okaloosa County, and continue along Santa Rosa Sound to Gulf Shores, Baldwin County, Alabama.

Melongena corona thrives in all appropriate habitats throughout Florida and Alabama. Due to the snail's inherent variability, small semi-isolated populations may be slightly different from each other. The *Melongena corona* complex possibly represents a polymorphic species, as opposed to a polytypic one.

Selection for certain physiological adaptations, which may or may not be apparent, are possibly due to specific environmental conditions. If the adaptations are phenotypically apparent, such morphs, as well as their delimitations are then as difficult to describe as the delimitations of their causative factors (Mayr, 1969).

Melongena corona populations from southern Florida may display a third row of spines, between the shoulder and basal rows. This character was not found in this study. The southern range of the species should be re-evaluated.

Data from the present study indicate that Clench & Turner's (1956) descriptions of subspecies of *Melongena corona* from the northeastern Gulf of Mexico are not valid. My data show that subspecific classification is not warranted by the characters previously used.

ACKNOWLEDGMENTS

I express my appreciation to Mr. Dan O'Leary, Jr., of Crawfordville, Florida, for allowing me to study his *Melongena corona* collection. Many thanks to Ms. Karen Swift and Ms. Sandra Mossburg for their help in the collection of specimens. I am also grateful to Dr. Jerry Oglesby for his advice on statistical procedures and Mr. Ray Johnson for his aid in the analysis of the data. This research was partially supported by an Environmental Protection Agency grant to Dr. Paul V. Hamilton. I am most grateful to Dr. Charles N. D'Asaro for encouraging me to write this paper and for the long hours he spent editing it.

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